GRACE

Construction Products Division

To: J. W. Wolter

Date: August 22, 1980

From: F. W. Eaton

Subject: Slot Screened L-2 (SS-2) Summary

cc: H. C. Duecker
H. Mason
W. J. McCaig/Libby
W. R. Wright
E. S. Wood
J. C. Yang

GENERAL

Due to process delays at Libby, an initial 30 ton shipment of Slot Screened L-2 (SS-2) was shipped to Weedsport to start Engineering tests and meet committed plant orders. Libby continued producing a car (90 + ton) of SS-2 to complete the intent of the test protocol. The test protocol dated 4/25/80 specified a yield test, and fiber sampling on simulated attic tests and industrial use applications. The protocol was revised 6/20/80 to include fiber sampling of plant personnel processing SS-2, actual home attic installation (bound and unbound), simulated attic (bound and unbound) and actual grower use of unbound terra-lite vermiculite. The latter tests covered by the revised test protocol were conducted with the 2nd shipment (90 + T) of SS-2 received in Weedsport 6/26/80. This summary does not include all test results. Due to work priorities and scheduling of test events, it was not possible to complete the total scope of work in the time span planned. Since friends and people of means are unreliable for actual home attic tests, the thrust now and in the future will be the poor and the needy. The approach to potential liability problems with older homes with questionable electrical wiring and structural members has been reviewed by the Legal Department. Although test results are incomplete, it is felt what data is available should be reported at this time to assist Research, Engineering and Management in its work and evaluation of proposed slot screen circuits at Libby.

YIELD TESTS 6/3/80

Prior to putting the 30T of SS-2 into the silo, Weedsport emptied the silo to a flat heel to eliminate contamination and enable the plant to determine an actual yield on the first 30 tons. Before starting the test, all equipment was cleaned (concentrate hopper, stoner, bag hopper, screen and volumetric conveyor) to reduce contamination and to start at point zero. During the test, +14M product, -14M fines, rock, cyclone fines and bag house fines were collected and weighed. Since concentrate was not weighed, the average 12% expansion loss determined for super clean L-2. (SCL-2) was used to determine expansion loss and back into calculations to determine concentrate usage. This 12% value is probably accurate for SCL-2 due to the drying method but high for SS-2 since bag weights and rock are less than assay.

Product (unbound) during this test was bagged in 4cf plastic bags for J. D. Brush with one volume check made per pallet. Test results vs assay are as follows:

YIELD TESTS CONT'D

	TEST	ASSAY
Yield (B/T)	95.9	98.4
Rock Content (%)	5.3	6.4
Bag Weight (lbs/bag)	16.87	17.1

Production rate during this 4 hr - 50 min. test run averaged 97.64 bags/hr (130-3CF/HR) with ease and no problem with hot bags. Actual yield for the 30 tons as reported by Weedsport was 108.2 bags/ton.

90-4CF bags of this test run have been set aside for simulated attic tests or any other requested tests.

Samples for Quality Control tests in accordance with the test protocol were checked as baggage. Their condition upon arrival in Boston did not warrant Quality Control analysis. Duplicate samples were taken on the 90 T shipment 7/23/80. Quality Control tests and tremolite analysis are covered in another section of this summary.

PRODUCTION OBSERVATION 2nd SHIPMENT 90 + TON SS-2

To obtain data specified in the revised test protocol and evaluate the new GCA fibrous aerosol monitor, additional SS-2 was processed during the week of 7/21/80. No production or yield data was collected during these runs as the main purpose was to take air samples and produce bound and unbound product for consumer use testing.

Prior to running 6cf Terra-Lite 7/23/80, the plant had processed approximately 25T of the 90T second SS-2 shipment. Thief samples for Quality Control analysis were taken from this test run. Observation of the product and waste fractions looked the same as samples taken and observed on the initial 30 ton shipment. The concentrate appeared to have more dust on the platelets.

On 7/24/80, 150 - 3cf unbound and 150 - 3cf bound attic insulation bags were produced. Fines in the concentrate increased in time and it was observed that there were approximately twice as many cyclone fine collected with the bound material as were collected on unbound. No determination was made on -14M screened unders. Cause of these fines could be due to segregation in the car during shipment, segregation in the silo or process changes at Libby.

QUALITY CONTROL ANALYSIS

As compared to super clean L-2 (SCL-2) the particle size distribution for the + 14 fraction SS-2 was some what larger. The fines fraction

of SS-2 (-14M & cyclone fines) was smaller than SCL-2. Another disappointing result of these tests is the % heavy particle in the +14M product. If I had not not been present to verify that the 14 mesh screen had been cleaned and operating properly, I would guess the reason for high tremolite content in 2nd shipment +14M product was due to improper screening. H. P. comparison between SCL-2 and SS-2 is as follows:

	SCL-2	SS-2
+14M	0.53	1.3
-14M	0.93	3.0
Cyclone fines	0.87	2.7
Baghouse fines	-	3.1

There is one main difference in the method of taking the sample composite for SCL-2 and job sites tests vs SS-2. The SS-2 samples were taken with a thief and SCL-2/job site are hand grab samples.

TREMOLITE ANALYSIS

The RFTS's attached show a difference in tremolite content of the concentrate but do not reflect the change in fines or concentrate/product cleanliness. This has been proven before that you cannot relate fines to tremolite content and/or fiber exposure. The same is true as far as tremolite content vs tremolite fiber exposure.

Listed below is a comparison between SCL-2 and SS-2:

SAMPLE	% TREMOLITE SCL-2 UNBOUND	SS-2 30T UNBOUND	SS-2 90T UNBOUND	SS-2 90T BOUND
Concentrate	0.77	0.53	0.78	0.76
+ 14M product	0.016	0.05	0.57*	0.13*
- 14 M screen unders	0.99	8.40	-	-
Cyclone fines	0.013	0.95	-	-
Bag house fine	0.36	4.1	-	-
Rock	15.51	17.9	-	-

* SEE NOTE 1

NOTE:

1. Lab reports that samples were of insufficient size to make accurate tremolite analysis.

FIBER EXPOSURE/CONCENTRATION RESULTS

Referring to the attached air sampling record sheet, a brief comment is made for each sheet.

1) GCA FIBROUS AEROSOL MONITOR EVALUATION - A separate report will be issued on this evaluation. Its interesting to note that the highest count is in the lunchroom. One possible reason could be that the Quality Control man was making bag volume check outside the lunchroom and completing log sheet at the lunch room table.

2) BAGGER PERSONNEL SAMPLES - Bagging 6cf SS-2 Terra-lite. Counts higher than normal due to 6cf bag free fall and inadequate dust control for 6cf bags.

3) FURNACE ROOM ENGINEERING SAMPLES - No comment except believe counts are more due to residual dust/fiber than SS-2 fiber release.

4) BAGGER ENGINEERING SAMPLES - Believe higher counts for bound SS-2 product is due to binder spraying into bag and displacing with force fiber laden air from bag.

5) BAGGER ENGINEERING SAMPLES - Same location as (4) except bagging bound L-1 Attic. Lower counts for samples A1-3 and A1-4 are due to lower production due to equipment problems.

6) SIMULATED ATTIC TEST - This one test with bound SS-2 (0.25 qts/cf w/0.5% CMC) is very disappointing. The average concentration of installers exposure was 1.21 f/cc. Average concentration of five tests for bound L-1 produced 9/26/79 was 0.563 and for unbound super clean L-2 produced 3/29/78 0.74 f/cc. There should be a better profile of bound and unbound SS-2 when simulated attic tests are completed in September.

7) GROWER USE OF SS-2 TERRA-LITE VERMICULITE - This material shipped to Early Bird Farms was SS-2 from the 30 ton shipment but not part of any Engineering test run. The mixer (batch redi-mix), located outside, had been charged with peat. The 18 minute sampling period covered emptying 17 - 6 cf bags of Terra-Lite and one pre-mixed bag of Peters fertilizer. Average fiber concentration of 0.57 f/cc is also disappointing and is approximately twice as high as unbound L-2 and four times higher than bound L-2 tested inside at Arrowhead Gardens.

CONCLUSION

No firm conclusions will be drawn at this time on the possible justification of slot screened concentrate as a means of user exposure reduction to fibrous tremolite. It can be concluded that slot screened concentrate:

1. Reduces rock and total tremolite content
2. Reduces waste disposal costs
3. Increases yield
4. Increases production throughput
5. Reduces hot bags
6. With less stoner air, reduce potential furnace room fiber concentration.

F. W. Eaton

FWE/gm

Attachment

8/21/80

SLOT SCREENED 1-2
YIELD TESTS.

30 TON SHIPPED 5/7/80 CAR NO CBQ 184560

AR ASSAY YIELD 98.4 BAGS/TON
ROCH 6.4 %
MOISTURE 9.7 %
BAG WT. 17.1 LBS
BULK DENSITY 51.7 LBS/CF

WEEDSPORT EXPANSION TEST RESULTS 6/3/80

1.	PRODUCT (472-4CF BAGS) NET.	7962.67 LBS.
2.	STONER ROCK	458.81
3.	CYCLONE FINES	188.63
4	-14M SCREEN UNDERS	37.19
5.	BAG HOUSE FINES	11.85
6.	EXPANSION LOSS (SEE NOTE 1)	1180.71
7.	CONCENTRATE USED (SEE NOTE 1)	9839.26
8.	PRODUCT PRODUCED (4CF)	472
9.	FURNACE TEMP	1612°F

% ROCH = $\frac{458.81 \times 100}{9839.26 - 1186.71} = 5.3\ \%$

AVE. BAG WEIGHT = $\frac{7962.67}{472} = 16.87$ LBS/4CF BAG

(1)

YIELD (ASSUMING 4CF/BAG) = $\frac{472}{\frac{9839.26}{2000}}$ = 95.91 BAGS/TON (SEE NOTE 2)

THROUGH PUT = $\frac{472}{4\text{HR}-50\text{MIN}}$ = 97.64 BAGS/HR.

NOTE:

1. EXPANSION LOSS = CONCENTRATE − PRODUCT + SCREEN UNDER + CYCLONE FINES + BAG HOUSE FINES + ROCH

FROM SUPER CLEAN 1-2 TESTS, EXPANSION LOSS WAS APPROX 12%

∴ LET X = CONCENTRATE USAGE

$$\frac{X - 8658.55}{X} = .12$$

$$X - .12X = 8658.55$$

$$X = 9839.26$$

EXPANSION LOSS = 9839.26 − 8658.55 = 1180.71 LBS.

2. WEEDSPORT PLANT RECORDS FOR THE 1ST 30 TON SHIPMENT INDICATED A YEILD OF 108.2 BF/TON. IN THE 2ND SHIPMENT OF 90+ TON, P.R. REYER ESTIMATES YIELD ARE 95-98 BF.

CONSTRUCTION PRODUCTS DIVISION

REC'D JUL 03 1980 C.P.D. ENG.

PAGE 1

NUMBER: 67895
GROUP: ZONOLITE BPD
DATE: 6-16-80
CHARGE NO.: 1000
REQUESTOR: F. W. EATON
MARKETING or MANUFACTURING APPROVAL:
NAME:
APPROVED:

REQUEST FOR TECHNICAL SERVICE

PROBLEM TITLE: SLOT SCREENED 1-2

SIGNIFICANCE: PROTOTYPE SLOT SCREEN WAS INSTALLED IN CIRCUIT OF LIBBY SCREENING PLANT TO FURTHER PURIFY OR REDUCE ROCK CONTENT IN CONCENTRATE

SPECIFIC OBJECTIVE: DETERMINE TREMOLITE CONTENT IN FRACTIONS COLLECTED DURING EXPANSION TRIALS

SUGGESTED APPROACH:

DEADLINE (Last day information will be of value):

DETAILS OF PROBLEM:

DETERMINE TREMOLITE CONTENT (%) OF SLOT SCREENED 1-2

1. CONCENTRATE
2. ROCK
3. CYCLONE FINE
4. BAG HOUSE FINES
5. + 14 MESH
6. − 14 MESH

ACCEPTED BY RESEARCH DEPT.: [signature] DATE: 6/16/80

ASSIGNED TO: ~~J. Carnale~~ C. T. Walloch

ADDITIONAL COPIES: Original to Library H. C. Duecker J. W. Wolter E. S. Wood F. W. Eaton

CONFIDENTIAL

REQUEST FOR TECHNICAL SERVICE

NUMBER: 67895
GROUP: ZONOLITE BPD
ACTUAL COST: $650.00
REPORTING DATE: June 25, 1980

SUMMARY:

Two sets of slot screened L-2 fractions were analyzed for tremolite content.

RESULTS:

TREMOLITE CONTENT

Sample	Set 2 % Tremolite Hand-Picked	Set 2 % Tremolite XRD	Set 2 % Tremolite Total	Set 4 % Tremolite Hand-Picked	Set 4 % Tremolite XRD	Set 4 % Tremolite Total	Total Ave.
1. Concentrate	.53	.07	.60	.24	.22	.46	.53
2. Rock	4.6	10.8	15.4	4.1	16.3	20.4	17.9
3. Cyclone Fines	----	.62	.62	----	1.3	1.3	.95
4. Baghouse Fines	----	4.1	4.1	----	---	---	4.1
5. +14 Mesh	----	.03	.03	----	.06	.06	.05
6. -14 Mesh	----	9.9	9.9	----	6.8	6.8	8.4

APPROXIMATE ROCK CONTENT (NON-VERMICULITE)

Sample	Set 2 % Rock	Set 4 % Rock	Ave.
1. Concentrate	0.8	0.5	0.6
2. Rock	100.0	100.0	100.0
3. Cyclone Fines	8.6	8.6	8.6
4. Baghouse Fines	----*	----*	----*
5. +14 mesh	1.0	1.2	1.1
6. -14 mesh	46.9	47.3	47.1

*Not determined. Baghouse fines were analyzed directly by x-ray diffraction.

C. T. Walloch

CTW:mlr